IMPERIAL
DEPARTMENT OF AGRICULTURE
FOR THE WEST INDIES.

REPORT

ON THE

AGRICULTURAL DEPARTMENT,

ST. VINCENT.

1912-13.

BARBADOS :
ISSUED BY THE IMPERIAL COMMISSIONER OF AGRICULTURE
FOR THE WEST INDIES.

1913.

[Price Sixpence.]

REPORTS

ON THE

BOTANIC STATION, ECONOMIC PLOTS AND AGRICULTURAL EDUCATION, ST. VINCENT.

Annual Reports on Certain Economic Experiments conducted in connexion with the Botanic Station, 1900-2.

Annual Reports on the Botanic Station for the years 1901 and 1902.

Annual Reports on the Botanic Station, Economic Experiments and Agricultural Education for the years 1902-12.

SUGAR-CANE EXPERIMENTS.

IN BARBADOS.

Report of the Agricultural Work for 1900 :—
Manurial Experiments and Experiments with varieties of Sugar-cane.

Report of the Agricultural Work for the seasons 1899-1901 to 1908-10.
Parts I and II ; Manurial Experiments. Part III ; Varieties of Sugar-cane.

IN THE LEEWARD ISLANDS.

Report on Experiments conducted with Sugar-canes in the season 1899-1900.

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Part I ; Varieties of Sugar-cane. Part II ; Manurial Experiments.

Sugar-cane Experiments in the Leeward Islands, 1911-12.

Parts I and II published together in Royal 8vo.

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12. Progress in the arrowroot and cassava industries has been satisfactory, not owing to favourable yields, but rather to the favourable prices which have been obtained. Some importance attaches to the report on ground nut cultivation. The area under this crop is extending and it may, in the near future, be possible to inaugurate an export trade with Canada in this product under the new preferential tariff.

13. The report of the Agricultural Superintendent concludes with an account of changes that have taken place in the organization of the Department.

14. Appended to the report reviewed above, is that of the Government Veterinary Surgeon. A seemingly satisfactory introduction has been the single anthrax vaccine. It not only facilitates vaccination work, but enables stock-owners to prepare their animals for export in about half the time taken formerly.

(Sgd.) FRANCIS WATTS,

Commissioner of Agriculture
for the West Indies.

REPORT ON THE AGRICULTURAL DEPARTMENT, ST. VINCENT.

For the Year ended March 31, 1913.

Work in Botanic Gardens and Observations on Plants.

Considerable progress was made with the scheme for opening up the Gardens in order that they may be made more accessible to visitors. The most important work in this direction was the formation of a driving road of easy grade and nearly ½-mile in length round the Gardens. This entailed the building of a new section of road through the nutmeg plot to the east of the Agricultural Superintendent's residence; the widening of the existing roads; the building and widening of several culverts; besides a good deal of levelling, clearing and replanting.

Visitors can now see a good deal of the interesting old Gardens in a short space of time without having to leave their carriages. Although the road was only opened for traffic towards the end of the year under review, it was freely used and much appreciated. Plate 1 shows a section of the road.

In order to commemorate her visit to the island, Her Highness Princess Marie Louise of Schleswig-Holstein was graciously pleased to plant a young mahogany tree (*Swietenia Mahagoni*) close to the entrance of the newly made section. The ceremony was performed in the presence of a large gathering of people.

His Honour the Administrator and the Hon'ble Mrs. C. Gideon Murray were also pleased to plant two trees of Bermuda cedar (*Juniperus bermudiana*) on August 28, in a prominent position near to the road.

The removal of large and unsightly mango and Java plum trees attacked by scale insects and covered with 'black blight' was continued. There are now but few blighted trees that require to be dealt with.

Owing to the unusually wet weather experienced in the months of December, January, February and March, the soft shield scale insects were not able to increase in consequence of the continued spread of the entomogenous fungus (*Cephalosporium lecanii*), therefore in the coming season 'black blight' is not likely to be so much in evidence. It has been observed for several years now, that the soft shield scales are held in check to a considerable extent by this fungus during the wetter months of the year, but tend to spread rapidly in the drier periods. In this connexion it might be mentioned that observations were made on the distribution of the fungus on scale insects throughout the island, and in all districts it was found to occur.

The Imperial Commissioner of Agriculture obtained from herbarium material supplied, the names of several of the different species of Eucalyptus cultivated in the Gardens and Experiment Station, of which labels and records were lost.

The following is a list of the named species at present in cultivation:—

E. creba
E. saligna
E. calophylla
E. patentinervis
E. tereticornis
E. paniculata
E. siderophloia
E. alba? (*leucoxylon*)

The identification of the plant that produces the bark from which the fermented drink ' mawbee ' or ' maibie ' is made was successfully undertaken. The species, (*Calubrina reclinata*) belongs to the order Rhamnaceae, to which order also belongs the North American plant *Rhamnus Purshiana*, which produces the well-known cathartic ' Cascara Sagrada '. *C. reclinata* is found on rocky promontories along the leeward coast of St. Vincent and is now a comparatively rare plant owing to its having been ruthlessly cut down for the sake of the bark. It forms a small bushy tree with light green wood and a very dark smooth bark. Only the latter is used in the preparation of the beverage, which is said to possess tonic and laxative properties. It is largely drunk by the peasantry. Cuttings of the wood were collected and plants rooted to provide specimens for the Gardens.

Of two plants of the Sandal wood tree of India (*Santal album*) raised in 1909, one has survived and appears to be well established. It is being grown in the centre of a ring of small plants of *Murraya exotica* in the hope that it may make use of the roots of these plants to help to carry on its existence. The Sandal wood tree is now generally considered to be a parasite on the roots of Murraya and a number of other plants, and therefore unable to thrive in the absence of a suitable host.

An effort was made to ascertain the origin and age of some of the old trees in the Gardens, and the Imperial Commissioner of Agriculture was good enough to obtain from the Director of the Royal Botanic Gardens, Kew, a copy of the Catalogue of Plants in the Botanic Garden, St. Vincent, in 1806, together with notes from the Rev. Lansdown Guilding's account of the Garden, published in 1825. Extracts from the letters of Dr. Anderson, the Superintendent from 1785 to 1811, to the Society of Arts were also supplied. These contributions have been found very interesting and helpful.

The number of species recorded in the catalogue totals 1,355, classified under the following heads: Commercial and Medicinal; In Economy; Esculents; Valuable Woods; Fruits; Exotics, Curious and Ornamental.

In Guilding's Account the dates of introduction of several economic plants are given, and the following extracts relate to the more interesting introductions:

'About 1787 the Clove (*Caryophyllus aromaticus*) and several varieties of Cinnamon (*Laurus Cinnamomum*) were introduced from the French Islands to which they had been brought by their ships from Asia. The Clove shortly after this period, was cultivated zealously in Dominique. In Jamaica the Cinnamon was planted on a large scale in many parts of that extensive Colony.

'Mr. Anderson, the Superintendent, who "with great pains collected the most remarkable of the native plants, and in his excursions to other islands, obtained many curious species, ... in 1791 sailed to Guiana in search of valuable plants where his zeal was amply rewarded."

'There appear to have been three different Cinnamons, one introduced about 1785 from the island of Martinico, apparently the Ceylon Cinnamon, the two others introduced in 1785 from the East Indies by the French; a plant of each was sent to the Garden in 1787: one of these came from Martinico, the other from a gentleman of St. Lucia who had obtained it from the captain of a frigate from the Isle of France bound to St. Domingo.

'Trials were made to introduce *Cactus Coccinellifer*, and to introduce the Cochineal insect.'

Apropos of the introduction of bread-fruit, Guilding states that 'Captain Bligh . . . . in January, 1793 . . . . landed the best portion of his valuable cargo, about 530 plants, on the shores of St. Vincent The young trees which were as vigorous as if they had only travelled from our mountains . . . . were instantly planted out, and after a proper interval distributed among the colonies. . . . . In 1794 the breadfruit tree began to bear.'

Several nutmegs and other plants were introduced from Cayenne in 1809 after having been nursed in Trinidad, but according to a letter reproduced as a footnote, Anderson himself introduced nutmegs and true black pepper in 1802.

In a letter to the Society of Arts from St. Vincent on November 18, 1803, Anderson writes: 'Some Tea trees, Pepper and Mulberry, which I have planted in the new ground, are thriving remarkably well, as is the Manna Ash. The Mulberry I fancy to be little value: If it is, let me know that I may increase it.'

Anderson died on September 8, 1811, and of him Guilding says on page 19: 'To this industrious and respectable botanist the Garden owes its prosperity. Since his death it has in some degree declined.'

At the time that Guilding wrote, the mango, mahogany and teak appear to have been fine trees.

A photograph of the endemic tree *Spachea perforata*, Juss, will be seen (Plate 2). The old specimen shown is growing in the Gardens and was probably planted by Anderson.

It was a local tradition that Captain Bligh brought other plants besides breadfruit from the South Seas to St. Vincent in 1793, among these being the mango, of which there are fine old specimens in the Gardens and in the Government Office grounds, but it is now quite clear that he only landed breadfruit plants.

To continue the description of work done in the Garden during 1912-13, it may be stated first that plants of Para rubber (*Hevea brasiliensis*) were put out in a small plot, formerly occupied by the Central American rubber trees (*Castilloa elastica*). The latter have proved very susceptible to the attacks of scale and other insects. The Para rubber plants were raised from seed obtained from Singapore.

One of the clove trees (*Eugenia caryophyllata*) produced a quantity of seed which enable plants to be raised. The clove is rather an uncommon tree locally.

About a thousand bulbs of the red lily (*Hippeastrum equestre*) were planted out on a grassy bank to form the nucleus of a wild bulb garden. The red lily planted is a particularly good type, the flowers measuring 6 inches in diameter, and expanding well.

A dwarf variety of sun-flower (*Helianthus annuus*), originally obtained from the Botanic Gardens, St. Lucia, was grown for seed. This has proved a very satisfactory plant for beds and borders. It flowers freely and withstands wind well.

Several plants of the fragrant-leaved Eucalyptus (*E. patentinervis*) were planted out in the Gardens.

Some of the rarer palmst hat fruited were *Livistona altissima*, *L. Jenkinsiana*, *Thrinax Morrisii*, *Latania Loddigesii*, *Hyophorbe Verschaffelti*, *Stevensonia grandifolia*, *Dypsis madagascariensis*, *Sabal Blackburnianum*, *Seaforthia elegans*, *Licuala grandis*, and *Chrysalidocarpus lutescens*.

The above list is given with a view to the possibility of making exchanges with other Botanic Gardens, as is also the following, which contains the names of a few of the striking trees, flowering shrubs and climbers which fruited:—

Ixora fragrans, *Rivina humilis*, var. *pubescens*, teak (*Tectona grandis*), *Solandra grandiflora*, Travellers' palm (*Ravenala madagascariensis*) *Spathodea campanulata*, *Michelia Champaca*, *Unona discolor*, velvet tamarind (*Dialium guineense*), *Brownea grandiceps*, *Beaumontia grandiflora*, *Gustavia insignis*.

The whole area of the Garden was kept in good order throughout the year. There is now no portion of the 14 acres not under regular control.

Among the plants added to the collection were the white mulberry (*Morus alba*), Sapucaia nut (*Lecythis Zabucajo*), *Fagraea zeylanica*, *Aleurites Fordii*, and *Colvillea racemosa*.

Work in the Nurseries and Distribution of Plants.

The work in the nurseries was carried on along the usual lines.

A large number of seedlings of pink poui (*Tabebuia pentaphylla*), *Eucalyptus tereticornis*, crimson spathodea, (*Spathodea campanulata*), mahogany (*Swietenia Mahagoni*), and yellow poui (*Tabebuia spectabilis*) were raised for planting along the new public road out of Kingstown. In accordance with a suggestion contained in a memorandum submitted to the Government by the Agricultural Superintendent, it is proposed to plant definite sections of the road with these trees, using one kind of tree along the side of each section.

Beds were planted up with seedlings of the white mulberry in order to provide plants for distribution in the event of a silk worm industry being started.

A number of Para rubber seedlings were raised and distributed to Richmond and Three Rivers estates where small plantations have been formed.

A large quantity of seed of red cedar (*Cedrella odorata*) was collected and distributed to estates.

Two hundredweights of Bengal bean (*Stizolobium aterrimum*) were also sent out. This bean is now largely grown for green dressing purposes.

The usual number of economic plants, namely, cacao, grafted mango, nutmeg, cinnamon, coffee and hardwood trees was raised, besides a stock of foliage and flowering plants.

The following is a list of the plants, cuttings, etc., distributed :—

Plants in pots.		Plants and cuttings (not in pots).	
Cacao	1,690	Sugar-cane, selected varieties ...	8,850
Nutmeg ...	21	Para rubber stumps	1,008
Grafted mango	8	Palms	126
Cinnamon ...	6	Gliricidia (cacao shade) ...	28
Hardwood trees	187	Vanilla	50
		Orchids ...	7
Total	1,912	Foliage and flowering	872
		Total	10,941

A small quantity of produce was sold, namely, cured cacao 254 lb., nutmeg 7 lb., and 60 coco-nuts.

PLANT AND SEED IMPORTATIONS.

Seed of the following species were received and sown : Sunn hemp (*Crotalaria juncea*), *Diospyros* sp., *Claviga ornata*, *Geonoma vaga*, *Livistona Hoogendorpii*, *Juniperus barbadensis* from the Head Office of the Imperial Department of Agriculture; *Asparagus Sprengeri* from the Royal Gardens, Kew; *Peltophorum ferrugineum* from the Dominica Botanic Gardens; oil palm (*Elaeis guineensis*) and lime seedlings from St. Lucia Botanic Garden; cassava cuttings in four varieties from the Experiment Station, Montserrat, and sugar-cane cuttings in six varieties from the Antigua Experiment Station.

Fig. 1. View Along New Driving Road, Botanic Gardens, St. Vincent.

Fig. 2. An Interesting Old Tree, *Spachea perforata*, Botanic Gardens, St. Vincent.

Plot Experiments at the Botanic and Experiment Stations.

BOTANIC STATION.

As mentioned in previous reports, there is very little land suitable for plot or field experiments, so that the greater part of the work was carried on at the Experiment Station attached to the Agricultural School.

At the Botanic Station, however, Sea Island cotton plant selections were continued in a small plot with a type first selected in 1910. Two or three plants have been selected each season representing the healthiest of those grown and possessing other desirable characteristics. The object of this was to raise, if possible, a type of plant which would produce a good crop in districts where the rainfall was above the average of the coast lands. During the past season three plants were selected as showing considerable freedom from the bacterial and fungus diseases, which make Sea Island cotton cultivation such a very speculative undertaking in the wetter districts of the island. Three seasons' continuous work, therefore, had now been done in this direction, and as the results were promising, notwithstanding that the season was the worst experienced since the introduction of the Sea Island cotton industry, seed from the plot will now be sent out for trial in acre-plots on two or three estates in wet districts.

The average monthly rainfall of the past three years for each of the months of the growing season was as follows :—

June	11·12 inches	September	12·03 inches
July	10·65 „	October	9·98 „
August ...	11·61 „	November	9·24 „

EXPERIMENT STATION.

The Experiment Station is situated on a fairly level stretch of land just at the back of Kingstown and a few feet above sea-level. The soil is a black sandy loam fairly rich in the low-lying portions but rather poor and shallow on the upper. The average annual rainfall of the past twelve years was 84·67 inches. In view of the re-organization of the work of the Department, the whole area of the cultivable land, about 11 acres, was replotted and rearranged at the beginning of the year, and a fairly comprehensive series of experiments laid down in continuation and extension of those conducted in previous years. The Station was divided up into sections and each was laid out in $\frac{1}{10}$- acre plots and marked off with hardwood pegs. The larger number of experiments were with cotton ; but plots of arrowroot, cassava, sugar-cane varieties, green dressing plants, vegetables, Indian corn, fodder and other plants were also planted.

Experiments with Sea Island Cotton.

MANURIAL EXPERIMENTS.

Only a small number of manurial experiments could be laid down as the area available was limited. The land selected for these experiments was flat and apparently of a fairly uniform nature throughout. Certain parts had been more thoroughly cultivated than others, but the soil generally was in good fertile condition. Owing to this circumstance, it was not expected that the results obtained during the first two or three years would enable any reliable conclusions to be drawn as to the advantages or otherwise of the application of any special or mixed manures.

The experiments were carried out in three series on plots of $\frac{1}{10}$-acre each, and the following table gives the first season's results :—

No. of experiment.	Nitrogen lb. per acre as sulphate of ammonia.	Potash lb. per acre as sulphate of potash.	Phosphoric acid lb. per acre as basic phosphate.	Cotton seed meal lb. per acre.	Seed-cotton, lb. per acre.			Mean.	Diff : on No Manure.
					Series 1.	Series 2.	Series 3.		
1	No	Manure			943	476	569	663	...
2	30	...	...	...	980	628	978	862	+199
3	...	...	40	...	901	939	855	898	+235
4	...	30	...	...	733	779	746	753	+ 90
5	...	30	40	...	759	938	830	842	+179
6	30	30	40	...	811	719	356	629	- 34
7	...	...	...	600	784	873	505	721	+ 58
8	30	30	40	600	831	876	553	753	+ 90

It will be observed that the yields in all cases were low. This was due to a large extent to the wet weather experienced during the ripening season. The seed sown was ordinary seed such as was produced on estates where no special selection work had been done to obtain plants showing resistance to fungus and bacterial diseases. The result was that a very large number of bolls were attacked and spoilt even after they had almost reached maturity. It was estimated that on some of the plots nearly 50 per cent. of the bolls were lost.

PLANT SELECTION FOR RESISTANCE TO DISEASES.

Since the 1909-10 season, cotton plant selection work has been carried on at the Station. The different local types of Sea Island cotton have been under observation as well as certain other kinds. The most important line of work undertaken was the selection of plants for resistance to the bacterial and fungus diseases—' angular spot ' (*Bacterium malvacearum*), anthracnose (*Glomerella gossypii*), and West Indian leaf mildew. Plants showing resistance to the first, however, claimed most attention.

In 1911-12, no less than 250 plant selections were made, and the seed from 130 of the most promising of these was sown in separate rows. During the past season eighty-six further selections were made in the plots. It is of interest to record that the type which gave the highest yield and showed most resistance to the 'angular spot' disease was No. 1 (A.S.) which had undergone selection over the longest period.

The following is a brief description of the types grown and from which selections were made :—

TYPES OF COTTON GROWN, 1912-13.

No.	Mark.	Class	Yield of seed-cotton per acre lb.	Ginning per cent. of lint.	Yield of lint per 100 seeds (lint index).	Average length of lint.	Remarks.
1	A.S. ...	Ordinary Fine Sea Is.	974	25·96	4·2 gms.	1·9 in.	A selection from the Rivers' type which is largely grown on estates for the production of St. Vincent 'ordinary' cotton. First selection, 1909-10.
2	C.J.S. ...	'Superfine' Sea Is.	693	20·30	2·93 „	2·2 „	The first selection was made by a local planter 3 years ago. The lint is of excellent quality but the ginning percentage is low.
3	O.H. ...	Ordinary Fine Sea Is.	308	24·41	4·16 „	1·9 „	A selection first made in 1909-10 on an estate—Rivers' type.
4	St. Kitts	Ordinary Fine Sea Is.	720	25·00	4·40 „	1·9 „	From seed of a St. Kitts selection, 1911-12. Rivers' type; closely resembles A.S. in all its characters.
5	B.H.1. ...	'Superfine' Sea Is.	543	23·52	3·90 „	2·0 „	A selection from the chief local 'superfine' type
6	B.H.2. ...	'Superfine' Sea Is.	329	25·00	4·30 „	1·9 „	Similar to B.H.1., but lint not quite so good.
7	B.S. ...	Ordinary Fine Sea Is.	350	24·78	3·95 „	1·8 „	Selected in a plot of B.H. 1909-10.
8	M. ...	'Superfine' Sea Is.	285	24·39	4·32 „	2·1 „	Similar to B.H.1, but has larger seeds.
9	Pauls ...	'Superfine' Sea Is.	168	25·09	4·20 „	1·8 „	Selected on account of strength of lint. Seed presented to the Department by a local estate owner, 1912.
10	Sakell. ...	Egyptian Fine	265	32·14	6·01 „	1·5 „	Grown from seed saved 1911-12. Variety imported 1911.

The lint index is included in the above table as it has been clearly pointed out in Circular No. 11 of the Bureau of Plant Industry, U. S. Department of Agriculture, that there is a danger of putting too much reliance upon lint percentage. In this pamphlet it is shown that the question of lint percentage is of the greatest use commercially, i. e. in the buying and selling of seed-cotton, but from the standpoint of the agriculturist and breeder, other factors have to be considered. Thus an increased lint percentage may mean a decrease in the weight of the seed instead of an increase in the weight of fibre. 'If in a variety having 33 per cent. of lint the weight of seed were increased by one-third, the lint percentage would fall to about 26, even though the amount of lint were increased by 3 per cent. to correspond with larger surface.'

It will be readily conceded that small, light seeds are undesirable, as a large plump, heavy seed is more likely to produce a vigorous plant. Yield per acre is another factor that must be taken into consideration, as high yields are often obtained from low percentage cottons.

Quality and lint percentage are shown to be usually inversely connected, i. e. good quality means a low percentage.

Lint index (weight of lint from 100 seeds) is recommended as a means of avoiding some of the uncertainties of lint percentage.

Lint percentage would still he employed as a standard commercially, and as a ready means of ascertaining the lint index ; for (weight of 100 seeds ÷ ratio of seed) – weight of 100 seeds – weight of lint from 100 seeds (lint index)*. Even the lint index, however, should be used in conjunction with field tests.

In connexion with the St. Kitts selection, this was said to produce a high percentage of bolls with four locks, but the selected types B. H. and A. S. grown at the Station showed greater superiority in this respect.

Owing to the unfavourable season all the lints were more 'wasty' than usual, but the actual amount of weak fibre or 'waste' was difficult to determine in these long and fine types as the fibres lie very close together and tangle up so much that the weaver's comb takes out a good many of the strong fibres. Taking the greatest care, from 40 to 54 per cent. of so-called 'waste' lint was combed off the seed of all the types. This matter will receive further detailed attention during the coming season, as the results so far obtained are far from satisfactory or convincing.

SAKELLARIDES EGYPTIAN COTTON.

A ¼-acre plot was grown from seed of the previous season. The plants again proved extremely suspectible to 'angular spot'. The average length of lint was 1·5 inches ; the percentage of lint to seed-cotton was 32·14, and the lint index, 6·01. In these two latter respects this variety was superior to the local Sea Island types, but the lint was much shorter and coarser. As will be described later on, under the drier conditions of the southern Grenadines the Sakellarides cotton has done much better.

MARIE GALANTE COTTON.

In the southern Grenadines there are several distinct types of 'Marie Galante' cotton gown. It was observed that after ginning there were at least three classes of seed : (a) clean, (b) tufted, and (c) woolly. Seed of each class was picked out and sown in separate plots with the object of endeavouring to ascertain if these represented three distinct types ; if so, to what extent they differed, and whether by means of a mechanical separation of the seed this class of cotton could be improved. The plants from 'woolly' and 'tufted' seed were similar in appearance, but those from the 'clean' seed were quite distinct from them and more robust. All grew to a height of from 7 to 8 feet, but very few flowers were produced, and only a small number of bolls. The seed-cotton from the few bolls that did mature was insufficient for a thorough examination of the lint and seed characters. The 'clean'-seeded type produced only 'clean' seeds, the 'tufted' a few 'woolly' seeds, and the 'woolly' a few 'tufted'. The results were such that no definite conclusions could be drawn, and the experiment requires to be repeated under more favourable climatic conditions than were experienced in 1912-13 season.

THORNTON'S HYBRID F_2.

The second generation of this hybrid cotton was planted for demonstration purposes, and when sufficient time had elapsed to allow the different types of plants to be clearly seen, they were pulled up and burnt to prevent crossing with plants in other plots near by.

The following is an account of work in hybridization started by the Assistant Agricultural Superintendent, together with notes by him of some of the objects aimed at.

* In the Circular quoted it is stated that the weight of 100 seeds ÷ percentage of seed = weight of 100 seeds before ginning. This minus weight of ginned seeds gives the lint index.—Ed.

Eight crosses were successfully made between the No. 1 (A.S); No. 4 (St. Kitts); No. 5 (B.H.1) and No. 10 (Sakellarides Egpytian) cottons.

(1) A healthy No. 10 (Sak) as female × No. 1 (A.S.) as male
(2) The reciprocal cross of the above was not successful, but another plant of No. 1 (A.S) as female × with another No. 10 (Sak) male
(3) A No. 1 (A.S) female × No. 5 (B.H.1) male
(4) Same No. 1 (A.S) female × another No. 5 (B.H.1) male
(5) A No. 1 (A.S) female × No. 4 (St. Kitts) male
(6) A No. 5 (B.H.1) female × No. 1 (A.S) male
(7) Another No. 5 (B.H.1) female × another No. 1 (A.S) male
(8) A No. 4 (St. Kitts) female × No. 5 (B.H.1) male

Some Characters of No. 10 Sakellarides.—Plants 5′ to 5′ 6″ in height. Early flowering and maturity. Seeds, size similar to No. 1 (A.S) much fuzz: Lint moderately coarse, medium length (1·5 inch), regular and evenly distributed.

Some Characters of No. 1 (A.S).—Plants 4′ in height; not so early to flower and mature as Sakellarides. Seeds, very little fuzz. Lint fine, good length (1·9 inch) less regular and not so evenly distributed as No. 10 (Sakellarides)

Relying upon Balls' statements of provisional allelomorphic pairs published in the *Journal of Agricultural Science*, Vol. II, No. 4, the F_1 generation of crosses Nos. 1 and 2, should be of a height* intermediate between the parents and intermediate as regards early flowering and maturity. The seeds should be well covered with fuzz. Lint should be long*, regular and evenly distributed over the whole seed. The good length of No. 1 (A.S.) lint may be due to the special soil and climatic conditions that obtain in St. Vincent. The innate length may be less than 1·9 inch. It should be pointed out that the complete dominant or partial dominant nature of the characters in the heterozygote were given as provisional: more evidence being needed in many cases.

No. 5 (B.H.1) is a type producing many tertiary branches, which immediately flower without much vegetative growth, hence the number of bolls per tree is high, but they are small in size compared with No. 1 (A.S.) hence the crosses 3, 4, 6, 7 were made with the object (a) of ascertaining to what extent the tertiary habit of branching is a hereditary character, and (b) of getting a larger boll combined with the tertiary branching character.

Crosses Nos. 5. and 8, were made with a similar object to the above.

Selection for 'four' lock bolls.—As mentioned on page 16, No. 4 (St. Kitts) is a cotton reputed to bear a large proportion of bolls with four loculi, but No. 1 (A.S) and the B.H. types were found to be superior in this respect. A number of seed was saved and will be sown separately to find out whether this character is hereditary or purely vegetative.

Experiments with Other Crops.

The large amount of work undertaken with cotton delayed the preparation and planting of other crops, but among those planted were the following:—

ARROWROOT.

Planting on banks. The object of this was to find out whether (a) the yield under this system would be satisfactory and (b), if so, whether it would be possible to harvest the rhizomes with a digging machine in order to save labour and money.

CASSAVA.

Planting at distances of 5 feet × 1 foot, 5 feet × 2 feet, and 5 feet × 4 feet, to test quantity and quality of roots produced under each system. Preliminary experiments were made with scraping, slicing and sun-drying the roots, but owing to the short growing and wet ripening periods the yield of dry material was low. It is intended, however, to prepare large samples with a view to ascertaining if a profitable export trade in desiccated root can be started. There appears to be an unlimited demand for the product.

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* Balls mentions in the paper referred to cases of intensification as regards these two characters without being able to throw any light upon the cause. Hence F_1 may be taller than No. 10 (Sakellarides) and bear longer lint than No. 1 (A.S.). Such intensification does not usually show any permanence, though it is sometimes carried over into F_2.

SUGAR-CANE VARIETIES.

A selection was grown chiefly to provide plants for distribution. The following varieties were under cultivation: B. 208, D. 95, B. 147, B. 6450, D. 109, Sealy Seedling, B. 1753, B. 4596 and B. 1528.

Notes on Economic Plants.

BENGAL BEAN (*Stizolobium aterrimum*).

This bean is largely grown locally as a smother and green dressing crop. When allowed to fruit a large quantity of beans is produced. It was thought that the beans might be ground into a meal and used as a feeding stuff for stock, provided they contained no poisonous compounds. An export trade might also be started.

A sample of the beans was therefore collected and sent to the Director of the Imperial Institute, and the following report was furnished :—

RESULTS OF THE EXAMINATION OF BENGAL BEANS.

DESCRIPTION.

'The sample consisted of beans of an oval shape, about $\frac{5}{8}$-inch long, $\frac{7}{16}$-inch wide and $\frac{1}{4}$- inch thick. The beans had a brittle shiny black testa, and a hard straw-coloured interior. In a number of cases they were slightly soft and discoloured internally, owing to their not being completely dry. The taste was faintly bitter.

'The beans were plump and free from insect attack, and the sample was generally clean and free from extraneous matter.

RESULTS OF EXAMINATION EXPRESSED ON MATERIAL AS RECEIVED.

Moisture	13·8 per cent.
Crude proteins	25·8 „ „
consisting of—	
True proteins	22·5 „ „
Other nitrogenous substances	3·3 „ „
Fat	3·5 „ „
Starch, etc.	48·8 „ „
Fibre	4·9 „ „
Ash	3·2 „ „

NUTRITIVE VALUE.

'Nutrient ratio: 1 : 2·2

(The ratio between the percentage of crude proteins and the sum of the percentages of starch and fat, the latter being first converted into its starch equivalent).

'Food units: 122·1

(The total obtained by adding the percentage of starch to 2·5 times the sum of the percentages of fat and crude proteins.)

'The beans contained no alkaloids or cyanogenetic glucosides.

COMMERCIAL VALUATION AND REMARKS.

'The beans were submitted to a large firm of merchants in London, who valued them at from £5 10*s.* to £7 per ton, c.i.f. United Kingdom ports (February 1913). The firm added that these prices represent the value of the beans as a feeding stuff for animals, as it would hardly be possible to find a market for them in the United Kingdom for human consumption.

'There seems to be no doubt that these beans could be safely used as a feeding stuff for cattle, since they are already so employed in Mauritius (see Bulletin No. 24 de la Station Agronomique de Maurice, p. 55. Mauritius: Store-keeper General's Printing Establishment, 1910). On account, however, of the high nutrient ratio of the beans, it is considered advisable to dilute them with other feeding stuffs which are not so rich in proteins.'

Gru-gru Palm Nut.

Specimens of the nut of this palm which occurs in considerable numbers on the dry rocky coast lands of the island were collected and the 'meats' extracted and sun-dried. It was intended to submit the copra so produced for examination and report, but in the meantime there was published in the *Agricultural News*, Vol. XII, p. 180, a report by the Director of the Imperial Institute on a sample of Gru-gru nuts sent from Grenada. The species of palm producing the nut is given as *Acrocomia sclerocarpa*. From an examination of herbarium material at Kew in 1908, the writer came to the conclusion that the Gru-gru palm of St. Vincent was most probably *Acrocomia lasiospatha*, Mart. The description given of the Grenada gru-gru nuts, however, compares very closely with that of the St. Vincent nuts.

It may be of interest to local planters to know that, according to the report furnished by the Director of the Imperial Institute, the kernels of the nut contain 56·2 per cent. of a white crystalline fat which resembles both coco-nut and palm kernel oils. The value of oil palm kernels in the United Kingdom was from £22 to £23 per ton, ex-quay Liverpool (April 1913), and it was stated that gru-gru kernels should fetch about the same price. Shipments would be required in lots of from 50 to 100 tons at a time to establish a market.

There does not appear to be any likelihood of any shipments being made in such large quantities as the palm is being rapidly destroyed all along the coast to make way for cotton cultivation.

The following information as to yields was obtained:—

Bunches per palm per annum	1 to 4
Fruits (nuts) per bunch	200 to 300
Weight of 400 fruits	10 lb.
„ „ the 350 sound kernels from above	2 lb. 2 oz.
„ „ „ dry kernels	1 „ 9½ „
Percentage loss in drying.	25 per cent

Work Connected with Insect and Fungus Pests and their Control.

WORK WITH PESTS AND DISEASES.

Mr. H. A. Ballou, M. Sc., Entomologist of the Imperial Department of Agriculture, made a tour of the Leeward and Windward Districts of the island with the Agricultural Superintendent. The Botanic and Experiment Stations were also visited and inspected. Mr. Ballou's visit extended from October 13 to November 1.

The following is an extract from a report submitted to the Administrator and published in the *Government Gazette*:—

Cotton.

COTTON WORM. (*Alabama argillacea*).—During the present season cotton has been attacked in St. Vincent by the cotton worm. This is the second time since the re-establishment of the cotton industry that it has been necessary to resort to artificial measures for the control of the cotton worm. The former occasion was in 1907 when a severe attack was experienced at Argyle. The attack of the present season was more general, being particularly severe across the the southern end of the island. Prompt action, and the vigorous use of Paris green resulted in checking the ravages of the worms.

From what I was able to gather, I formed the opinion that the cotton worm occurs in St. Vincent throughout the cotton-growing area every year, but not generally in sufficient numbers to be noticed by the planter. The severe attacks in 1907 and 1912 have probably followed an invasion or flight of moths. These most likely come from the Cays—Bequia, Union or Canouan.

The control of the cotton worm in St. Vincent ordinarily is due to the action of its natural enemies. Of these, there can be no doubt that the wasp (*Polistes annularis*) commonly called the Jack Spaniard is by far the most important. I was surprised to see the enormous numbers of these insects and their nests, especially the latter. The number of the Jack Spaniards in the fields was not so very remarkable since one is accustomed to see these insects always about cotton plants but the extraordinary numbers of the nests in and about estate buildings, both those in ruins and those in trees, especially coco-nut and other palms, were sufficiently unusual to attract the attention at once.

On nearly every cotton plant examined in all parts of the island, Jack Spaniards were seen searching leaves, stems and branches most industriously; in most instances however, they were not seen to catch anything; they must have been accustomed however to finding prey on these plants, else they would not be so thorough in their search. I was informed that in Bequia where the cotton worm occurs in great numbers there are no Jack Spaniards, or at least very few.

Up to the present time, then, the cotton worm has been kept in check by its natural enemies, chief of which is the Jack Spaniard, except in 1907 and 1912. These two attacks ought to be taken as a warning by the planters of St. Vincent, that in any season the natural enemies may fail to hold the cotton worm in check, and in the event of this happening they should be prepared to resort to the use of poisons immediately.

LEAF-BLISTER MITE. (*Eriophyes gossypii*). —I was particularly struck by the comparative scarcity of plants showing the effect of leaf-blister mite attack. On the estates where I rode or walked through cotton cultivations I saw but few plants showing the least sign of attack, probably no more than one or two plants in any field, except in one small field at Petit Bordel where there were several. At New Adelphi, Mr. Sands discovered and destroyed a badly attacked plant near a peasant's hut.

The almost complete absence of anything that can be called wild cotton and the freedom from leaf-blister mite, must, it appears to me, be the result of extreme vigilance on the part of the planters and others concerned in keeping down this pest.

The practice of destroying any blister-mite-infested plant as it appears in young cotton would account in some measure for the excellent appearance of the cotton in the field, but the practice of destroying the old cotton as soon as possible after the crop is gathered, is also of great value. The Ordinance which provides for the destruction of old cotton at such a time as to give a close season each year seems to me to be especially useful.

BLACK SCALE (*Saissetia nigra*).—Black scale is a serious pest at times and over small areas. This insect is not parasitized to anything like the same extent in St. Vincent as in Barbados. This may be due to the different degree to which the parasite has adapted itself to the climate in these islands. As the Jack Spaniard is a much more efficient control of cotton worm in St. Vincent than in any other island, so it appears is *Zalophothrix mirum* more efficient in Barbados as a check on the black scale than in other islands. It may be possible, however, that it will become more efficient in time.

For several years past a small bronze beetle has been reported as attacking young cotton in St. Vincent and the Cays. These beetles eat the leaves and probably cause a certain amount of injury to the plants. At the time of my visit however, only a few could be found. A knowledge of the life-history of the insect, especially with regard to where the grub occurs would be of interest and value in this connexion.

During the present season, an insect was reported to be attacking the young buds of cotton, causing them to drop. This proved to be the immature form of a bug. During my visit, two species of bugs were found on cotton, either or both of which might be concerned in the injury reported. One of these is a common insect, *Edessa meditabunda*, which is referred to later in this report as attacking ground nuts. This insect occurs on Acalypha and probably on other related plants.

The other bug referred to is a shield-backed bug, which was found attacking cotton in St. Lucia some years ago. This insect in its form and the development of the scutellum to cover the entire back resembles a beetle. The colour is a dark, purplish-brown.

Coco-nuts.

I examined coco-nuts in the Leeward district and at several other places.

SCALE INSECTS AND WHITE FLY.—From recently received accounts of the abundance of scales and white fly on coco-nuts in certain localities in St. Vincent, I expected to find these insects in much greater numbers than I did. A great change had apparently taken place, and while scales and white fly were present in all parts of the island, there were but few instances noticed where these insects occurred in such abundance as to indicate any great damage being done. At Wallilabo, for example, where these insects had occurred in great numbers, they were comparatively scarce at the time of my visit.

The species of scales most commonly occurring on coco-nuts in St. Vincent are the Bourbon scale (*Aspidiotus destructor*), the tessellated shield scale (*Eucalymnatus tesselatus*), while occasionally the black line scale (*Ischnaspis longirostris*) occurred in some numbers. The tessellated shield scale appeared to be well controlled by *C. lecanii*.

Two species of white fly occurred, *Aleyrodicus cocois*, Curtis, and the other a species of *Aleyrodes*, which frequently occurs in company with the preceding species. This latter is much smaller in size than the *Aleyrodicus cocois*.

It is rather remarkable that in nearly every instance where a young colony of white fly is examined on a coco-nut leaf, there will be found in addition to both species of white fly, the Bourbon Aspidiotus and often other species of scale, all together among and beneath the waxy filaments of the white flies.

In the event of white fly becoming so abundant and injurious on coco-nuts as to render remedial measures necessary, cutting out old leaves and spraying the remainder with a contact insecticide would seem to be the best course to follow. Judging from preliminary trials on a small plan, I believe that 'Scalo' will prove of value for this purpose.

Every injury or cut in a coco-nut tree should be tarred immediately to prevent egg-laying by the palm weevil.

THE PALM WEEVIL.—The palm weevil (*Rhynchophorus palmarum*) appears to be of general occurrence throughout St. Vincent, and, I should judge, must be greatly on the increase in numbers. This results from the attempt to clear, for cotton growing in many districts, lands which have heretofore been covered in wild growths, among which were gru-gru palms (*Acrocomia Lasiospatha*).

The ordinary method of killing these palms, I understand, is merely to make a few cutlass chops in the trunk of the tree, thus aiding the female weevil in gaining access to the soft parts of the stem for the purpose of egg-laying. The larvae which develop within the tissues of the tree cause its death. On the leeward side of the island I saw enormous numbers of the gru-gru palms dead and dying, and Mr. Sands told me that in all probability these were all infested with the gru-gru worm, which is the larva of the palm weevil.

It is believed in many places that the palm weevil does not attack a healthy coco-nut tree in bearing. Young trees even when perfectly healthy may be attacked, while older trees, in which the development of the fungoid or bacterial disease has caused an acid or fermented condition of the sap, are most likely to be infested by these insects. It can hardly be doubted, however, that the increase in numbers of the weevils which must result from the rapid destruction of the gru-gru palms, will be accompanied by much greater attacks on coco-nuts than formerly, and every slight injury of the tree is likely to be availed of by the weevil for depositing its eggs.

It will be necessary to watch carefully all plantations of young coco-nut trees for the first signs of attacks, and when these are noticed the grub should be dug out and the wound in the tree treated with an application of tar. The same treatment might be applied to older trees in any instance of attack on these, and all wounds made in trimming or otherwise should receive an application of tar.

At the Botanic Station in St. Vincent, I saw a cabbage palm (*Oreodoxa oleracea*) which had just been cut, and around which several of the weevils were flying, apparently attracted by the freshly cut surfaces. The weevils often alighted on the pieces of the tree trunk, and afterwards hid under the chips on the ground.

Portions of the stem of coco-nut, gru-gru, cabbage and other palms might be used as traps for the palm weevil in coco-nut cultivations. For this purpose the softer portion of the stem of the gru-gru and coco-nut should be used, cut in short lengths, say, 3 or 4 feet, and split in half. After some four or five weeks these should be collected and destroyed, and a new lot put down for traps.

Cacao.

At Mount William we inspected Mr. Hadley's cacao, which was greatly improved in condition, thrips being present in only small numbers, and fungoid diseases not causing damage. Mr. Hadley is of opinion that the spraying done last year for thrips was of no value. The improvement, I believe, is to be attributed to the application of manures, forking, and general agricultural conditions, in part at least.

The history of this cacao is of interest. Most of the plantings are of considerable age except of course recent supplies. In 1898 the effects of the hurricane which visited St. Vincent in that year were severely felt by this cacao, which was further injured by the volcanic eruptions of 1902 to 1903, and it is likely that the unhealthy condition of these trees was largely the result of the injuries received at these times. This being so, the improvement recently made might easily be attributed to the cultural methods adopted.

I am of opinion that manifestations of natural phenomena such as hurricanes and volcanic eruptions exercise their influence on the welfare of trees and crops in ways not perhaps generally taken into account by planters, because the first effects are not to be seen. The mechanical injuries resulting from the action of violent winds breaking branches and twisting trees on their roots, and those caused by the falling of hot stones and ash are easily to be seen. In addition to this, there is to be considered the result of the death of enormous numbers of minute forms of insects which play an important part in maintaining a balance in the anima life of any district.

There can be no doubt that thrips, like other insects, are held in check, generally, by natural enemies. These in common with the hosts would be killed to a very large extent by the hurricane and the eruption, and in the process of recovery the development of the host insects (thrips and others) would be much more rapid, at first, and a considerable time would elapse before the former balance was restored, i.e. before the increase of natural enemies became sufficiently rapid to bring their numbers and efficiency to a level with that of their hosts.

The history of these trees and the attack of thrips upon them show a similar course of recovery, until now, when, as a result of good cultivation and healthy growth the trees have become strong and vigorous, and the thrips reduced by natural enemies to a minimum, the condition of the cacao on the whole is satisfactory.

Arrowroot.

The arrowroot in all parts of St. Vincent seemed to be healthy and not injured by insect pests.

The most common pest, and the best known, is the arrowroot moth, as it is called locally. This insect is not strictly speaking a moth, nor is it a butterfly, belonging as it does to a group rather intermediate between these two. This group is the Hesperidae, or Skippers. The arrowroot worm is *Calpodes ethlius*. The larvae roll themselves up in a portion of leaf where they are safe from the attacks of the Jack Spaniards. The eggs, however, are subject to the attack of parasites. The method of control in use in St. Vincent consists in sending the small gang through the field when the worms are abundant and searching for the worms in the leaf-fold, which when found are crushed in the fingers.

This method appears to give good results. It would be interesting, however, to compare the cost and efficiency of this method with the use of arsenicals applied as a spray or dust.

In most fields seen, the degree of infestation was not severe, nor were the adults observed in great numbers except in one field on the windward side where in passing in the early morning enormous numbers of the adults were seen flying about.

The rhizomes of arrowroot are often attacked by some insect which tunnels into them forming cavities which fill with soil and cause much extra work in the preparation of starch. Search was made for the insect causing the injury but without success. At Belvidere we found hard back grubs—one or two kinds, but Mr. Fraser did not consider these the cause of damage. A small green weevil was found on the arrowroot, which may be the parent of the grub which attacks the roots.

Limes.

One of the problems to which I particularly desired to find an answer was that which is presented by the present condition of limes and other citrus plants in St. Vincent. I examined carefully limes at the Agricultural School and at Queensbury, and in many other localities I had opportunities of observing the general condition of citrus trees.

In all parts of the island citrus trees are attacked by scale insects: black blight is to be seen on practically every citrus tree, and in the majority of cases in considerable abundance.

The scales most frequently seen are the green scale (*Saissetia viride*) on the leaves and young branches and twigs, and the white scale (*Chionaspis citri*) on the bark of the trunk and larger branches.

Purple scale (*Lepidosaphes beckii*) or (*Mytilaspis citricola*) is unusually rare in St. Vincent as far as I could see, and at the same time is but little parasitized. Green scale is very common and seems to be parasitized by Cephalosporium to a degree that should prevent this scale being a serious pest.

At the Agricultural School and at Queensbury I found what I suspect to be symptoms of a root disease and if a root disease of citrus exists in St. Vincent that may account for the difficulty of re-establishing citrus trees.

Ground Nuts.

Ground nuts are attacked in St. Vincent by a Pentatomid bug, which apparently in all its stages of development derives its nourishment by sucking the sap from these plants. This insect is *Edessa meditabunda*. It is rather less than $\frac{1}{2}$-inch in length, and about $\frac{1}{4}$-inch wide. The head, thorax and triangular scutellum are grass-green in colour, the wings being brown. The under side of the body is brown and greyish-brown.

I do not know whether spraying would be profitable on a crop, but it might be well for experiments to be tried in order that definite recommendations could be made in the event of a serious outbreak of the bug. I would suggest a trial of Scalo on adult bugs in captivity to ascertain the killing effect of the insecticide, and on ground nut vines to learn how susceptible these would prove to be to the effect of the soap and oil mixture. Scalo is a mixture of whale oil soap and kerosene, the formula for which has been worked out by Mr. J. C. Moore, Agricultural Superintendent, St. Lucia. It gives promise of being a most useful preparation, since the soap is made to hold an unusually large percentage of kerosene, which does not separate out in the stock mixture even when kept for a long time, and it is easily dissolved in water when wanted for spraying. I believe a sample of Scalo has been sent to Mr. Sands for trial, and the directions for making a further supply can be forwarded when desired. Spraying to control the bug would need to be done at a time when the eggs were hatching or had just hatched,—when the greatest number of young were present. This bug is said to be attacked by a fungus, but I did not see any instances of this.

Ground nuts are also attacked by several other bugs, and by a small caterpillar which tunnels into the tips of the stems, but I am unable to form any opinion of the amount of injury caused by these insects. It will be useful to have a good series of all these insects collected for study.

At the meeting of the Agricultural Society, Mr. Corea stated that ground nuts were attacked by mole crickets.

Cassava.

The cassava at the Agricultural School was attacked by a species of thrips. This insect caused a considerable deforming of the leaves, and a whitening of lines along the midrib and veins. I do not think it causes very much injury to the crop as it attacks principally the leaves. If it should seriously attack the early leaves it might produce serious results. Cassava infested with thrips might be sprayed with a contact insecticide such as rosin wash or 'Scalo'.

Pigeon Peas.

Pigeon peas (*Cajanus indica*) are grown in St. Vincent for green dressing and as a crop, on certain estates, and in some instances at least on a fairly large scale. In view of the importance of the pigeon pea as a manurial plant and also on account of the profits often derived from the crop of peas it may be useful to indicate some of the pests which may attack this crop. Pigeon peas, although grown throughout the West Indies are not often reported as being attacked by insect pests, but in such case as St. Vincent where there has been a rapid increase in the area devoted to this crop, insects which have heretofore occurred only in small numbers are likely to increase greatly with the abundant food supply.

The white scale (*Hemichionaspis minor*) occurs on pigeon peas, cotton, Hibiscus and other plants, as a white blight on the main stem and branches. It is not very likely to cause much injury to pigeon peas when these occupy the land as a 12-15 months crop, but if allowed to remain a second season they are likely to become seriously infested, and not only will they injure the pigeon peas but they will spread to adjoining cotton fields.[1] The white scale is controlled to a large extent by parasitic insects.

The leaves of pigeon peas are sometimes eaten by caterpillars, and the pods are often eaten out by similar insects and by weevils. These are not sufficiently well known to unable any specific directions for control to be given, but it would be useful for planters to be on the lookout for the first appearance of any of these insects and report the attack with specimens and full particulars to the Agricultural Superintendent, in order that more complete knowledge may be obtained and better information rendered available for their control.

Black blight or sooty mould as it is called is a saprophytic fungus which grows upon the sweetish secretions of certain insects, especially scale insects. This fungus, of itself, is not generally considered to cause any severe injury to the plants on which it occurs, but it is an indication of the abundance of scale insects. Such plants as mango, sapodilla, limes and coffee are specially noticeable at certain times of the year, in all the islands, from the dense covering of the black, sootlike fungus. The abundance of black blight however, often seems to be out of all porportion to the numbers of the scale insects present and, in the case of the citrus trees at least, the apparent injury is often greater than would be suspected from the number of scale insects present. On the other hand, mango trees seem to thrive although completely covered with the black blight year after year.

These remarks apply to the conditions as they existed in St. Vincent at the time of my visit. A parasitic fungus which kills certain scale insects is very abundant and wide-spread in its distribution. This fungus (*Cephalosporium lecanii*) is believed in Grenada to have reduced the numbers of scales insects to such an extent as materially to improve the black blight conditions in that island after that blight has been considered a serious pest for several years. If this improvement is as great in Grenada as it seems at the present time, it may happen that a similar improvement may result in St. Vincent later. Meanwhile planters should learn to distinguish between black blight, which is a result, and the scale insects which are the cause, and be in a position to form an opinion with regard to the relative amount of injury resulting from the presence of each of these so-called blights.

In Grenada, the seasonal distribution of Cephalosporium has been hastened by artificial means. This has been most commonly done by tying into trees on which scales and black blight were developing, bits of twigs and leaves bearing scales parasitized by the fungus. This practice might be adopted in St. Vincent.

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[1] The cotton worm continued to spread after the date of the above report in the southern windward and did a considerable amount of damage, by the

middle of November it was heavily parasitized by two Chalcid flies, *Chalcis ovata* and *C.* sp., and quickly disappeared. It is interesting to record that no damage was done to cotton in the leeward district or the higher windward district.

'This outbreak of cotton worm drew attention to the desirability of giving still further encouragement to the Jack Spaniard to breed and multiply. Although the value of the wasp is generally recognized in the Colony and the nests protected, yet in large open areas the number of insects cannot increase to the extent desired owing to lack of shelter and suitable places in which to build their nests. With the object of ascertaining whether it would be possible to furnish nesting places, a small open shed, protected from wind on N. E. side, was built in a cotton field at the Experiment Station. A nest with sealed brood was fixed to the rafters and in less than three weeks six nests had been started. These, however, gradually dwindled down as food became scarce, until in the dry season, March, only two were left. When food becomes plentiful it is probable that the number of nests will again increase. A point clearly brought out is that effective shelter from wind and rain is necessary and that the roofs of the sheds should be raised to a height of not less than 7 feet so as to allow the nests to hang well above the heads of labourers who may take temporary shelter in showery weather under the sheds.

In regard to coco-nuts, it should be mentioned that in two or three places a few trees were seen in a dying condition which had every appearance of 'bud rot'. These have since been cut down and burnt.

The coco-nut white fly (*Aleyrodicus cocois*) was much reduced in numbers towards the end of the year—due, it is thought, to an extensive parasitism by a small yellow and black hymenopterous fly. The coco-nut trees generally have since put out clean leaves and the 'black blight' on the old leaves due to the excretions of the fly, has disappeared to a large extent.

The insecticide 'Scalo' has been found very useful for spraying scale infected trees and plants. It destroyed most effectively all kinds of scale insects especially when used in the proportion of 1 lb. to 1 gallon of water. It was found not to damage any but very tender plants at this strength.

Among the insects of economic interest collected were :—

(a) A moth (*Duomitus punctifer*) whose caterpillars damage the leaves of the pink poui (*Tabebuia pentaphylla*).
(b) The coco-nut white fly (*Aleyrodicus cocois*) and its hymenopterous parasite
(c) A scale insect (unidentified) attacking the sour sop (*Anona muricata*)
(d) Queens of the common termite (species not named)
(e) The different forms of a large termite (not named) attacking the hard wood of *Pithecolobium polycephalum.*
(f) Two species of thrips severely damaging leaves of cassava
(g) A species of lace bug probably *Corythuca* sp. damaging the Egg Plant (*Solanum melongena*).
(h) A Lamiid beetle boring into the stems of peppers.

Where names are not given specimens have been sent to the Entomologist of the Imperial Department of Agriculture to be identified.

A most useful addition to the spraying machines and appliances of the Department was a 'Stoppeur' air compressing pump and four compressed air knapsack sprayers. This compressed air type of spraying machine is very handy and effective.

Specimens of the 'Furet' duster were also obtained. This is quite the bes type of appliance so far used for applying insecticides in powder form. It it worked by one hand alone, and by a simple contrivance it can be regulated t eject a fine, medium, or heavy dust.

Progress in the Chief Industries.

COTTON.

It is with regret that another very unfavourable cotton season has to be recorded. Up to the end of October, although the rainfall was below the average, the cotton fields were full of promise, the plants were bolling heavily and were quite healthy. From October to January the weather was very wet, rain falling almost every day. The almost ripe bolls were not able to open, and boll diseases destroyed a large proportion of the crop.

The rainfall at five stations in cotton districts in the reaping months was as follows :—

Month.	Agric. Exp. Station.	Cane Grove.	Petit Bordel.	Botanic Station.	Ratho Mill.
1912 November ...	10·51	12·16	7·00	10·91	9·87
December ...	10·44	9·19	9·30	11·93	8·04
1913 January ...	9·71	7·97	7·05	11·05	8·10
Total	30·66	29·32	23·35	33·89	26·31

There was little dry weather until March, by which time the season was too far advanced to have any beneficial effect on the crop.

An estimate of the past season's crop and its value compared with the crops and values of the two previous seasons is now given.

Cotton Crops.

Product.	1910-11.		1911-12.		1912-13.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
		£		£		£
Sea Island cotton ...	561,526 lb.	42,114	487,116 lb.	38,563	428,032 lb.	33,886
'Marie Galante' cotton	26,748 „	1,003	46,822 „	1,951	58,737 „	2,080
Cotton seed	787 tons	3,935	700 tons	3,500	640 tons	3,200
Total		£47,052		£44,014		£39,166

The average price of St. Vincent Sea Island cotton in 1910-11 was taken at 18*d.* and the 1911-12 and 1912-13 crops at 19*d.* per lb. The 'Marie Galante' cotton was estimated at 9*d.* per lb. in 1910-11, 10*d.* per lb. in 1911-12 and 8½*d.* in 1912-13. Cotton seed was placed at an all-round value of £5 per ton.

Area Planted and Yield per Acre.

The acreage returned as under cultivation was 4,344 acres of Sea Island cotton and 1,100 acres 'Marie Galante'. The total area was smaller by 661 acres than that of the previous season. This was due to a smaller planting of Sea Island cotton, namely 724 acres, as a result of the poor yield of the previous season. The 'Marie Galante' area was, however, increased by 63 acres.

Fig. 3. Show Case for Agricultural Products.

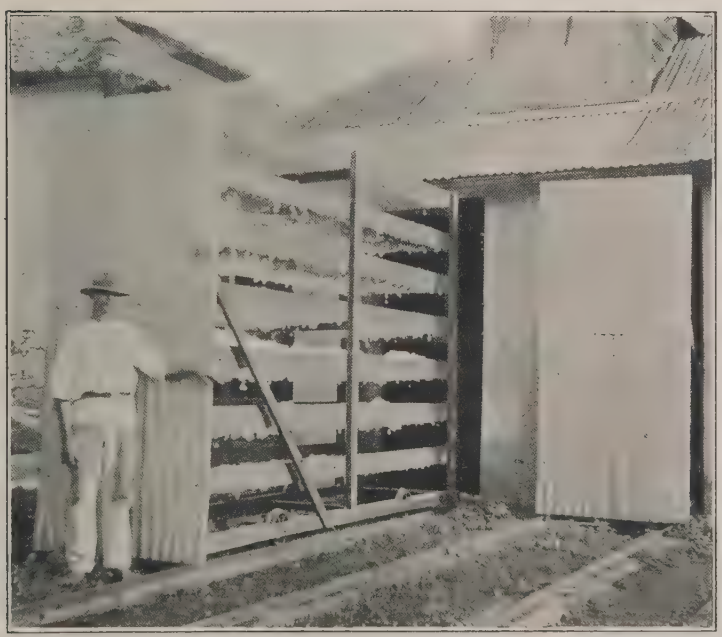

Fig. 4. Hazell's Cotton-Drying Apparatus.

The table given below shows the acreage planted in Sea Island cotton in each of the past eight seasons, the yield of lint and the yield per acre.

Crop.	Acreage planted.	Weight of lint in lb.	Yield of lint per acre in lb.
1905-6	790	137,460	174
1906-7	1,533	268,275	175
1907-8	3,200	432,000	135
1908-9	3,000	372,000	124
1909-10	2,528	356,139	141
1910-11	3,587	561,526	156
1911-12	5,068	487,116	96
1912-13	4,344	428,032	98
Average for eight years			136

The records for the two last seasons clearly show the disastrous effects of unseasonable weather.

The returns for 'Marie Galante' cotton showed that 1,100 acres were under cultivation last crop. The season was a fairly good one in the Southern Grenadines where this cotton is grown, and yields above the average were obtained. As mentioned in previous reports, the acreage returns are not very reliable; besides, the cotton is largely intercropped with Indian corn and pigeon peas.

The following are the 'Marie Galante' crop totals for the 1911-12 and 1911-13 crop seasons :—

Crop.	Area planted.	Total yield.	Yield per acre.	Est. value.
1911-12	1,037 acres	46,822 lb.	45 lb.	£1,951
1912-13	1,100 ,,	58,737 ,,	53 ,,	£2,080

A portion of the seed of the Sakellarides Egyptian cotton received in 1911 was sent to the Southern Grenadines and small plots were established in each of the islets, viz., Union Island, Canouan and Mayreau, but from Union Island only have reports been received in connexion with it: here the small plots gave excellent yields. The demand for seed for planting during the coming season has far exceeded the supply, which is a clear indication of the fact that the variety is considered a desirable acquisition by the small holders. The plants made strong, healthy growth under the drier climatic conditions and the cotton was far superior to the 'Marie Galante' in quality.

GOVERNMENT CENTRAL COTTON GINNERY.

The Agricultural Superintendent relinquished the control of the ginnery on September 30, but the following statistics in regard to cotton ginned during the 1912-13 season have been supplied by the manager of that institution :—

Kind.	Weight of seed-cotton in lb.	Weight of lint obtained in lb.	Percentage of lint to seed-cotton.	Percentage of stained lint on white.
From estates :—				
Sea Island (white) . .	481,556	123,336	25·6	
do. (stained) ...	105,115	25,589	24·3	20·7
Purchased from small growers :—				
Sea Island (white) ...	253,893	67,075	26·4	
do. (stained) ...	56,545	14,541	25·7	21·6
Purchased at Union Island, Canouan and Mayreau :—				
'Marie Galante' (white)	176,338	43,943	24·9	
do. (stained)	15,425	4,342	28·1	9·8

Although the lint percentages of the Sea Island seed-cotton dealt with were well maintained, yet the proportions of stained lint, over 20 per cent., were the highest recorded in any previous season, and this again is evidence of the unfavourable conditions under which the crop was grown.

In a wet season such as that experienced, the usefulness and value of suitable houses and apparatus for handling and drying the seed-cotton as brought in from the field was clearly demonstrated on most estates.

The photograph (Plate 3) shows a very efficient drying apparatus devised by Mr. C. O. Hazell, K.C., and used on his estates. Other useful and handy arrangements follow closely the sliding roof and sliding tray principles of cacao boucans. A description of Mr. Hazell's car system of drying was published in the *Agricultural News*, Vol. XI, p. 403.

STARCH INDUSTRY.

The minimum sale price fixed for arrowroot of good quality by the local Arrowroot Growers' Association in the Europe, Canadian and United States market, was 3*d.* per lb. This price, however, induced shippers of arrowroot of low grade to export it in large quantities to the United Kingdom, where it was not wanted. It is feared that substantial monetary losses will be incurred as a result of this action. The low grades are chiefly produced by the peasantry.

The following table shows the exports and value of arrowroot and cassava starch in each of the last five years :—

Year.	Arrowroot in lb.	Value.	Cassava starch in lb.	Value.
		£		£
1908	4,886,379	27,713	236,502	1,352
1909	5,594,498	31,792	195,166	1,009
1910	5,302,725	30,089	138,112	781
1911	4,254,130	40,430	221,562	1,269
1912	3,948,681	48,854	177,820	1,287

CACAO INDUSTRY.

There was little to record. Some slight extension of planting was undertaken in places where there was a good depth of soil. The exports of cured cacao in 1912 were, however, smaller than those of the three previous years.

The exports of cured cacao for the past five years are given below :—

Year.	Weight in lb.
1908	218,664
1909	241,294
1910	235,236
1911	285,869
1912	223,373

Progress in Minor Industries.

COCO-NUTS.

The increased attention mentioned in last year's report as being given to the planting of coco-nuts was continued. Besides the importation of over 10,000 nuts for planting purposes, a large number of plants were raised from nuts produced locally. The greatest extension of planting took place on the Carib Country estates, but on several other estates in the windward and leeward districts plantations were extended.

A report on the pests and diseases of coco-nuts in St. Vincent is given on page 17. The position in regard to these showed considerable improvement towards the end of the year and, provided due attention was given to the recommendations made in regard to their control, there appears to be no reason why quite a large and remunerative coco-nut industry should not be established.

GROUND NUTS.

These are grown on a fairly large scale—more particularly on the light sandy soils of the higher windward district. The export of unshelled nuts to the intercolonial markets—chiefly Trinidad—which amounted to 3,638 bushels in 1911, increased to 4,080 bushels in 1912.

It might be possible to make an extension of planting and inaugurate an export trade with Canada under the new preferential tariff, should prices prove satisfactory.

VANILLA.

The Agricultural Superintendent specially reported in the *Agricultural News*, Vol. XII, p. 116, on Mr. P. F. Huggins' vanilla cultivation and methods of curing the pods at Bellewood estate. In the report it was stated that the annual export of cured pods was 40 lb. and that Mr. Huggins was extending his cultivation and experimenting with different methods of training the vines. He had already achieved a fair measure of success in curing the pods.

AGRICULTURAL WORK IN THE COLONY.

The Agricultural Superintendent and Assistant Agricultural Superintendent paid periodical visits to out-districts. From September to December a large amount of travelling had to be done in connexion with the outbreak of the cotton worm. Most of the estates and small holdings on the Land Settlement estates were visited and advice and instruction given when desired in connexion with different crops and the control of pests and diseases.

Efforts in Connexion with Extension of Interest in Agricultural Products.

No exhibits were collected and forwarded to exhibitions during the year. The Agricultural Products Show Case in the Public Library was kept filled and arranged, and proved of much interest to visitors. A photograph of the case is shown in Plate 4.

Details of Administration.

RE-ORGANIZATION OF THE DEPARTMENT.

The whole system of agricultural education and instruction was re-organized in view of the cessation on March 31, 1913, of the Imperial Grand-in-aid. The following extract from a minute of the Imperial Commissioner of Agriculture to the Administraator, dated February 15, 1912, contains some of the proposals which were carried into effect on October 1. They are arranged under these heads :—

(a) The question of Agricultural Education as applied in the Agricultural School to boys from the Elementary Schools.
(b) The question of providing agricultural education for boys from the Secondary School.
(c) The question of providing for the duties of the Agricultural Instructor.

'I recognize that the feeling obtains in St. Vincent, as in Dominica and St. Lucia, that the form of Agricultural training to be given to boys from the elementary schools may with advantage be modified; at the same time it is to be noted that the Colonial Legislature may raise difficulties with regard to providing the funds for the maintenance of the Agricultural School on its present lines. Similar views have been expressed in Dominica and St. Lucia, and the work of the Agricultural Schools has been modified accordingly.

'After a very thorough discussion of the question with Your Honour, I recommend that the training to be given to boys from the Elementary Schools may, as soon as possible, be modified on lines similar to those now in operation in Dominica : to effect this, arrangements should be made to discontinue the boarding and clothing of these agricultural pupils, who should be required to live with their parents or with persons, approved by the Superintendent of Agriculture, within easy reach of the Experiment Station. The pupils should proceed daily to the Experiment Station, the Botanic Station, or other convenient place for training, and there they should be instructed in the practical work of agriculture and horticulture, very much as at present, a smaller amount of time, however, being given to studies in the school-room. At the same time it must be insisted upon that the agricultural pupils do receive a certain amount of oral and book training, in order that they may understand the nature of the practical work in which they are instructed. To this end it is desirable that these pupils shall be assembled daily for class instruction.

'In order to assist the pupils during the period of their training it is desirable that each shall receive a monetary allowance, which I think may provisionally be fixed for the present, as follows :—

During	the	first	six	months	of	training	4*s.* a week
,,	,,	second	,,	,,	,,	,,	4*s.* 6*d.* ,,
,,	,,	third	,,	,,	,,	,,	5*s.* ,,
,,	,,	fourth	,,	,,	,,	,,	5*s.* 6*d.* ,,

'The payments of these amounts and of the increments should be made conditional on good behaviour and industry. It is anticipated that the course of training may with advantage extend over two years.

'I fully believe that it is of advantage to the agricultural pupil not to be made the inmate of a school, the restrictions of which, together with the regulation of all his acts, fail to develop a spirit of reliance and self-control. It is, in my opinion, better for the agricultural pupil to learn to look after himself, under some moderate degree of supervision, and to learn how to handle to good advantage, the monetary allowance made to him.

'In the first instance it will probably prove adequate if provision is made for training ten agricultural pupils. Should it be possible to effect the proposed change in October next, the ten pupils may betaken from amongst those then attending the School.

'In admitting agricultural pupils, it should be laid down that candidates for admission must be at least sixteen years of age; they must be in good health, of good physique and must satisfy the agricultural authorities that they possess such intelligence and educational attainments as to be capable of benefiting by the instructions to be given to them.

'Reference may here be made to the *West Indian Bulletin*, Vol. XI, p. 444, and *Agricultural News*, Vol. X, pp. 135 and 248 for an outline of the scheme as applied in St. Lucia and Dominica.

'Concurrently with these changes, attention should be given to the question of providing agricultural training for boys from the Secondary School (Grammar School). This may readily be done by adopting the Cadet system now in operation in several places, notably in Antigua and St. Kitts. Under this system boys who desire to follow agricultural pursuits are allowed to attend certain classes at the Grammar School, as arranged in consultation between the agricultural authorities and the Head Master of the Grammar School, during the remainder of each working day, not occupied by this attendance at class; the cadets are engaged at the Botanic and Experiment Stations: here they receive instruction of an agricultural character relating to the principal crops of the district and the routine work of the Botanic and Experiment Stations. While thus receiving a useful technical training, the cadets are made familiar with the general methods of conducting correspondence, the keeping of books, pay lists and records, and they have opportunities of learning how to manage labourers, and to acquire much information of a thoroughly practical character. Provision is usually made for granting each cadet an allowance of 5*s.* a week, partly to assist him during his period of training and partly to accustom him to the use of small sums of money.

'In a few instances a further means of extending the training of cadets has been provided by arranging that certain junior posts for which small salaries are paid, shall be held for limited periods by cadets. (See *West Indian Bulletin*, Vol. XI, p. 443).

'Should it be decided no longer to board the agricultural pupils, the buildings of the Agricultural School would become available for the accommodation of the Grammar School, for which purpose they would serve admirably with little alteration. They would provide good teaching and class rooms together with quarters for the Head Master. The present quarters of the Resident Master of the Agricultural School would be the residence of the Assistant Agricultural Superintendent, and, as it is proposed that the Resident Master may become the Assistant Superintendent, this involves no change. The science class room, or detached building, would be available for use by agricultural pupils and Grammar School boys at separate periods without inconvenience.

(Sgd.) FRANCIS WATTS.

February 15, 1912.

The Agricultural Superintendent resided at the Agricultural School from April, to September 30, in order to carry out on the spot the details of the work of re-organization of the Agricultural School and Experiment Station.

Only two of the seventeen pupils on the books of the Agricultural School decided to enter under the new system, so that four other selected boys were taken on, making six in all, the number eventually decided on as the maximum, instead of ten.

Quarters were erected for Mr. S. L. Moseley, the Assistant Master of the School who became Foreman of the Experiment Station.

The Agricultural Superintendent relinquished control of the Central Cotton Ginnery on September 30, and the work was transferred to the Superintendent of Crown Lands. The Agricultural Superintendent, however, was appointed to act on the Committee of Management of the Ginnery.

Mr. Frank Birkinshaw, on the recommendation of the Director of the Royal Botanic Gardens, Kew, was on August 14 appointed Assistant Agricultural Superintendent and Science Master of the Grammar School and arrived in the Colony on August 26. Previous to leaving England he spent one month at the John Inness Horticultural Institution in order to study the newer methods of plant hybridization, as the subject was one of particular value for St. Vincent where efforts were being made to improve the varieties of cotton and other economic products on scientific lines. Mr. Birkinshaw resided at the Experiment Station and had immediate charge of the work there in conjunction with his other duties.

Correspondence and Distribution of Information on Agricultural Matters.

The routine and administrative work of the office was as usual considerable. A good deal of time had to be devoted by the Agricultural Superintendent to work in connexion with the different changes made in the Department.

The Agricultural Superintendent acted as Honorary Secretary of the Permanent Exhibition Committee; the Agricultural and Commercial Society and Honorary Correspondent on agricultural matters to the West India Committee.

Copies of the following publications were distributed free to planters and others:—

West Indian Bulletin, Vol. XII, Nos. 1 to 4; Report of the Entomologist, Imperial Department of Agriculture, on Insect Pests affecting crops in St. Vincent; "Insect Pests of the Lesser Antilles"; Report on the Agricultural Department 1911-12.

ADDITIONS TO THE LIBRARY.

The following books were added to the library:—The laws of St. Vincent (2 vols.); Coco-nuts—the Consols of the East, and the *Review of Applied Entomology* (Agricultural Series).

The following publications besides those of the Imperial Department of Agriculture were regularly received: The *Kew Bulletin; Bulletin of the Imperial Institute; Tropical Agriculturist; Gardeners' Chronicle; Trinidad Bulletin of Miscellaneous Information; Journal of the Jamaica Agricultural Society; Agricultural Bulletin of the Straits and Federated Malay States; Circulars and Agricultural Journal of the Royal Botanic Gardens*, Ceylon; *Gleanings in Bee Culture*, A. I. Root Co., Medina, Ohio; *Experiment Station Record*, U.S. Department of Agriculture; Reports of the Porto Rico Agricultural Experiment Station; *Official Bulletin of the Cuban Agricultural Department; Agricultural Review of the Philippine Department of Agriculture; Bulletin of the Bureau of Agricultural Intelligence and Plant Diseases; Proceedings of the Agricultural Society of Trinidad and Tobago.*

ADDITIONS AND REPAIRS TO BUILDINGS.

An additional bedroom was added to the Agricultural Superintendent's residence. A new bath room was also built. These additions add very considerably to the comfort and convenience of the house and were much appreciated.

EXPENDITURE, RECEIPTS, SALES OF PLANTS, etc.

The sum of £1,598 from local funds was voted for the upkeep of the Department, and of this £1,252 7*s*. 10*d*. was spent—a saving of £345 12*s*. 2*d*.

From Imperial Funds the sum of £360 19*s*. 8*d*. was spent. The details of expenditure were as follows:—

From Local Funds.

	£	s.	d
Salary, horse and travelling allowance, Agric. Supt. ...	256	10	0
Upkeep Botanic and Experiment Stations	473	12	6
Salaries and travelling allowances, Government Veterinary Surgeon and Govt. Vaccinating Officer ...	340	0	0
Other Charges, Govt Veterinary Department	147	7	4
Agricultural pupils allowances	34	18	0
Total	£1,252	7	10

From Imperial Funds.

	£	s.	d
Salaries of Resident Master, Assistant Master and Assistant Agricultural Superintendent	166	14	8
Upkeep Agricultural School	73	16	10
Labour, Botanic and Experiment Stations	120	8	2
Total	£360	19	8

From the unexpended balance on March 31, 1912, of the Imperial Grant-in-Aid of the Agricultural Department, the sum of £52 5*s*. 11*d*. was spent on Special Services as follows:—

	£	.s	d
Experiments connected with cotton and arrowroot ...	24	19	4
Spraying apparatus and experiments in spraying	18	15	9
Contingencies: Modification of work Agricultural School	8	10	10
Total	£52	5	11

The receipts for sale of plants and produce at the Botanic and Experiment Stations amounted to £31 13*s*. 10*d*.

METEOROLOGICAL OBSERVATIONS.

The rainfall for 1912 at the Botanic Station is the lowest on record. It amounted to 87·11 inches, and was 18·58 inches below the average of the past nineteen years. It was badly distributed.

Rainfall for the year 1912.

January	6·61	inches
February	3·93	„
March	4·09	„
April	4·45	„
May	2·72	„
June	6·23	„
July	8·79	„
August	9·59	„
September	6·35	„
October	11·51	„
November	10·91	„
December	11·93	„
		„
Total	87·11	„

The following table gives the mean monthly rainfall of the past fourteen years, 1899-1912.

Mean monthly rainfall 1899-1912.

January	6·37	inches
February	4·36	,,
March	4·34	,,
April	3·97	,,
May	7·71	,,
June	12·35	,,
July	10·72	,,
August	11·85	,,
September	10·94	,,
October	12·26	,,
November	9 04	,,
December	9·04	,,
	102·95	,,

It will be seen that April had the lowest average rainfall, namely, 3·97 inches and June the highest, namely 12·35 inches.

Complete rainfall returns for 1912 were received from twelve stations and are given below :—

Station.	Rainfall in inches.
1. Bellewood	109·25
2. Botanic Station	87·11
3. Agric. Experiment Station	77·13
4. Carib Country	76·91
5. Cane Grove	76·26
6. Georgetown	60·76
7. Petit Bordel	60·25
8. Cumberland	59·66
9. Ratho Mill	54·06
10. Bequia	52·88
11. Villa Point	51·57
12. Union Island	31·30

The monthly returns were published regularly in the *Government Gazette.*

Temperature.

The mean monthly shade temperature at the Botanic Station, 206 feet above sea level was 78·0° F. September had the highest mean temperature, namely 80·6° F, and February the lowest, namely, 73·5° F.

Atmospheric Pressure.

March had the highest corrected mean reading of the barometer, namely, 30·046 inches, whereas, November had the lowest — 29·871 inches. The highest corrected reading was 30·121 inches on February 27, and the lowest 29·809 on November 3.

Official Visits to the Station.

During her month's stay in the island, February 20 to March 26, Her Highness Princess Marie Louise of Schleswig-Holstein visited the Botanic Gardens on several occasions and appeared much interested in them.

His Honour the Administrator inspected the Gardens and Experiment Station at frequent intervals. The recent improvements effected in the Gardens were largely due to his keen interest in them.

The Imperial Commissioner of Agriculture arrived in the island on August 31, and remained until Sept 14. During his stay he visited estates and small holdings in the Leeward and Windward districts besides the Botanic and Experiment Stations. He conferred with the Administrator and the local officers on matters connected with the Department and the agricultural development in the Colony. He also discussed various important questions with planters. When passing the Colony to and from the islands north of St. Vincent the Commissioner took further opportunities of meeting the Administrator and Agricultural Superintendent.

Mr. H. A. Ballou, M. Sc., Entomologist of the Imperial Department of Agriculture, made a tour of estates and small holdings in the Windward and Leeward districts and inspected the Botanic and Experiment Stations. He also addressed a special meeting of the Agricultural and Commercial Society. His visit extended from October 18 to November 1.

(Sgd.) W. N. SANDS,

Agricultural Superintendent.

REPORT OF THE GOVERNMENT VETERINARY SURGEON ST. VINCENT.

For Year ended March 31, 1913.

The total sum expended was £487 7*s* 4*d*. made up as follows :—

	£.	s.	d.
Disposal of carcases	55	2	
Anthrax vaccine and appliances	45	12	2
Rent of office	12	10	
Messenger	12		
Telephone	5	16	
Salary and travelling allowance for Government Veterinary Surgeon	250		
Salary and travelling allowance for Government Vaccinating Officer	90		
Clerical Assistant to Government Veterinary Surgeon	12		
Contingencies	2	19	2
Special remuneration for examination of ears ...	1	8	
	487	7	4

The fees collected were :—

For exportation of stock ... ... £20 18*s*. 6*d*.

EXAMINATION OF EARS.

During the year 661 ears and 203 blood smears, made by the Police constables from ears taken to the Stations at Georgetown and Colonaire, were forwarded to the laboratory.

Besides these no microscopical examination could be made in seven cases owing to decomposition of the ears. The histories of these cases however, were not such as would lead one to suspect that death was due to anthrax.

No case of anthrax was descovered during the year.

VACCINATION

A new serum 'Single Anthrax Vaccine' made by Messrs. Evans Sons, Lescher & Webb, of Liverpool was introduced and tried. This vaccine, it was proved was quite as successful as the Double Vaccine which had been in use from the commencement of the anthrax campaign. Its use not only facilitated the work of the Department, but stock-owners were enabled to prepare animals for export for those Colonies requiring a certificate of vaccination, in about half the time taken formerly.

There were 1,643 animals treated of which 765 were inoculated with the double vaccine as against 878 with the single.

EXPORTATION OF ANIMALS

Certificates were granted for the exportation of 227 head of stock as against 549 in 1911-12, 576 in 1910-11, 392 in 1909-10, and 215 in 1908-9.

The animals shipped and the Colonies to which they were exported were as follows:—

	Cattle.	Horses.	Asses.	Goats.	Total.
Barbados	174	7	28	2	211
Trinidad	5	...	2	...	7
Grenada	2	3	...	...	5
St Lucia	...	2	2	...	4
	181	12	32	2	227

IMPORTATION OF ANIMALS

Rules and regulations were made under the authority of the Cattle Diseases Prevention Act of 1869, prohibiting the landing of any live stock coming into St Vincent until they had been inspected and found free of any contagious or infectious disease. For the purpose of carrying out this regulation, steamers and sailing vessels were boarded and one bull, nineteen horses, two mules, one ass, eight goats, and thirty-nine pigs examined.

A case of rabies having occurred in Trinidad, an Order was made prohibiting the importation of any dogs or cats from that Colony.

STATISTICAL INFORMATION

Seven tables are annexed which give full information with regard to general mortality, stock exports, etc.

Table A shows the districts in which deaths among stock occurred from causes other than anthrax.

Table B shows the districts in which deaths among stock occurred, the causes of which could not be ascertained owing to decomposition of ears.

Tble C shows the number of deaths on estates compared with the general mortality.

Table D shows number, kind, and value of stock exported for which certificates were granted, and the Colonies to which they were exported.

Table E shows the number, kind, and value of stock exported to Trinidad for which no certificates were needed.

Table F shows the total number of vaccinations for the year 1912-13.

Table G shows total vaccinations done in each district for the years 1907-8, 1908-9, 1909-10, 1910-11, 1911-12, 1912-13.

(Sgd.) C. P. STOUTE,

Government Veterinary Surgeon.

TABLE A.—SHOWING DEATHS IN DISTRICTS FROM CAUSES OTHER THAN ANTHRAX

District.	Cattle.	Horses.	Mules.	Asses.	Sheep.	Goats.	Pigs.	Total.
Kingstown ...	68	6	1	13	12	67	67	234
Calliaqua ...	35	3	1	13	2	9	8	71
Mesopotamia ...	69	8	3	17	14	25	24	160
Colonarie ..	25	6	0	16	13	12	15	87
Georgetown ...	38	3	3	13	8	23	28	116
Layou	30	3	1	6	8	8	18	74
Barrouallie ..	30	1	0	8	5	21	11	76
Chateaubelair ...	14	4	0	2	0	7	12	39
Total ...	309	34	9	88	62	172	183	857

TABLE B.—SHOWING DISTRICTS IN WHICH DEATHS OCCURRED THE CAUSE OF WHICH WAS NOT ASCERTAINED.

Districts.	Cattle.	Horses.	Mules.	Asses.	Sheep.	Goats.	Pigs.	Total.
Kingstown ...	0	0	0	0	0	0	0	0
Calliaqua ...	0	0	0	0	0	0	0	0
Mesopotamia ...	1	1	0	1	0	0	1	4
Colonarie ...	0	0	0	0	0	0	0	0
Georgetown ...	0	0	0	0	0	0	0	0
Layou	0	0	0	0	0	0	1	1
Barrouallie ...	0	0	0	0	0	0	0	0
Chateaubelair ...	0	1	0	0	0	0	1	2
Total ...	1	2	0	1	0	0	3	7

TABLE C.—SHOWING DEATHS ON ESTATES COMPARED WITH TOTAL MORTALITY.

Class.	On Estates.	Total Mortality.
Cattle	126	310
Horses	12	36
Mules	6	9
Asses	15	89
Sheep	29	62
Goats	9	173
Pigs	21	185
Total	218	864

TABLE D.—SHOWING NUMBER, KIND, AND VALUE OF STOCK EXPORTED FOR WHICH CERTIFICATES WERE GRANTED.

Description.	Barbados.		Grenada.		St. Lucia.		Trinidad.	
	No.	Value. £ s.	No.	Value. £	No.	Value. £	No.	Value. £
Cattle	174	870	2	10	0	...	5	25
Horses	7	120	3	70	2	40	0	...
Asses	28	84	0	...	2	6	2	6
Goats	2	10	0	...	0	...	0	...
Total	211	1,074 10	5	80	4	46	7	31

TABLE E.—SHOWING NUMBER, KIND, AND VALUE OF ANIMALS EXPORTED TO TRINIDAD FOR WHICH NO CERTIFICATES WERE NEEDED.

Class.	Number.	Value.
		£
Sheep	352	176
Goats	1,103	299
Pigs	1,316	1,316
Total ...	2,771	1,791

TABLE F.—SHOWING NUMBER OF VACCINATIONS FOR THE YEAR, 1912-13.

Cattle.	Horses.	Mules.	Asses.	Sheep.	Goats.	Pigs.	Total.
1,349	49	6	45	184	5	5	1,643

TABLE G.—SHOWING TOTAL NUMBER OF VACCINATIONS IN EACH DISTRICT FOR :

	1907-8.	1908-9.	1909-10.	1910-11.	1911-12.	1912-13.	Total.
Chateaubelair ...	587	172	344	410	265	14	1,792
Barrouallie ...	461	219	174	328	155	0	1,337
Layou	444	294	330	338	476	52	1,934
Kingstown ..	893	326	514	566	396	167	2,862
Calliaqua	773	346	834	509	292	121	2,875
Mesopotamia ...	1,286	1,028	1,346	1,169	929	945	6,703
Colonarie	461	293	770	201	208	276	2,209
Georgetown ...	649	755	567	204	160	68	2,403
Total	5,554	3,433	4,879	3,725	2,881	1,643	22,115

Note.—Table E was obtainedfrom the Customs.

Publications on Sale

OF THE IMPERIAL DEPARTMENT OF AGRICULTURE FOR THE WEST INDIES.

The 'WEST INDIAN BULLETIN'. A Quarterly Scientific Journal.

Volume I :—Full reports of the Agricultural Conferences of 1899 and 1900.
Only a very limited number of copies of the parts of Volume I are available, and these cannot be sold separately. Volume I, complete in original paper covers as issued, post free, 5*s*.
Volumes II, III, IV, V, VI and VII :—Price 2*s*. each. Post free, 2*s*. 8*d*.
Volume VIII, Nos. 1, 2 and 3 :—West Indian Agricultural Conference, 1907 ; Abstract of Proceedings and Reprint of Papers. No. 4 : Agricultural Conference, 1908 ; Presidential Address and Abstract of Proceedings. Price 6*d*. each number. Post free 8*d*.
Volume IX. Nos. 1, 2, 3 and 4 :—Reprints of papers read at Agricultural Conference, 1908, with summaries of discussions following. Price 6*d*. each number. Post free, 8*d*.
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